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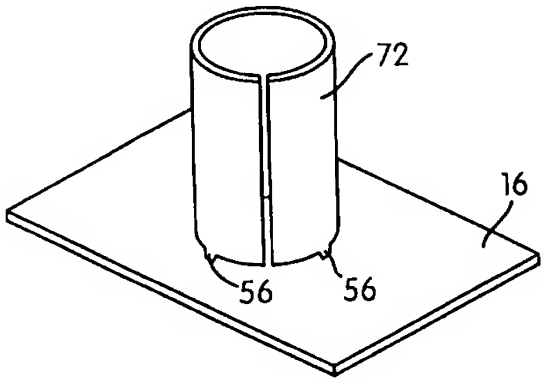
(57) Abstract

A method for making a spacer assembly comprises: forming a plurality of projections (56) along an edge of a portion of sheet metal; roll forming the portion of sheet metal into a tubular configuration (72); positioning the roll formed portion of sheet metal and a metal base member (16) to which the roll formed portion of sheet metal is to be welded in a discharge welding apparatus having a pair of electrodes so that the projections (56) of the roll formed portion of sheet metal contact a surface of the metal base member (16); providing a force so that the projections are disposed in forcible engagement with the surface of the metal base member; and supplying an electrical current between the pair of electrodes and through the roll formed portion of sheet metal and the metal base member so that the projections reach a molten metal stage and are subsequently solidified to enable the roll formed portion of sheet metal to be welded to the metal base member.



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(54) PROJECTION WELDED PANEL SPACER AND METHOD OF MAKING THE SAME

WIDERSTANDSBUCKELGESCHWEISSTER BLECHABSTANDSHALTER UND DESSEN HERSTELLUNGSVERFAHREN

ELEMENT D'ESPACEMENT POUR PANNEAU SOUDE ET A PROTUBERANCES ET PROCEDE DE FABRICATION

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Description

Field of the Invention

[0001] The present invention relates to spacers used in motor vehicle bodies.

Background of the Invention

[0002] In the automotive industry, spacers are used for various applications. For example, spacers have been used to support or reinforce a cross frame support structure which supports a truck bed on the vehicle frame. Conventionally, such spacers would be cut from a pipe or tube stock and mig welded to a plate member and positioned to assist the cross frame support in supporting the truck bed on the vehicle frame.

[0003] A shortcoming of this prior art construction is that mig welding requires extreme heat, which causes deformation of parts. In addition, mig welding is a relatively slow, cumbersome, and inefficient operation. In addition, the conventional spacers are not cost-effective from a materials point of view, as they utilize relatively expensive welded seam or seamless tubing.

[0004] One conventional welding joint is shown in U. S. Patent No. 1,411,340 to J. F. Gail. This patent discloses a sheet metal tube that, prior to the welding operation, is notched at an ending edge of the tube to leave a plurality of projections. Another conventional welding system is shown in U.S. Patent No. 2,051,216 to J. G. Jones et al., in which a number of incising projections are provided on a flange to cut into the metal of a tubular core during welding. As with other conventional systems, however, the metal tubes of these two patents are not cost effective because they use relatively expensive welded seam or seamless tubing.

[0005] It is an object of the present invention to overcome the disadvantages of the prior art noted above.

[0006] Accordingly, the present invention provides a method for making a spacer assembly comprises: forming a plurality of projections along an edge of a portion of sheet metal; roll forming the portion of sheet metal into a tubular configuration; positioning the roll formed portion of sheet metal and a metal base member to which the roll formed portion of sheet metal is to be welded in a discharge welding apparatus having a pair of electrodes so that the projections of the roll formed portion of sheet metal contact a surface of the metal base member; providing a force so that the projections are disposed in forcible engagement with the surface of the metal base member; and supplying an electrical current between the pair of electrodes and through the roll formed portion of sheet metal and the metal base member so that the projections reach a molten metal stage and are subsequently solidified to enable the roll formed portion of sheet metal to be welded to the metal base member.

[0007] It is a further object of the invention to provide a spacer that addresses the problems noted above. In accordance with this object, the present invention provides a projection welded panel spacer, comprising a metal base member defining an opening, and a sheet metal portion roll formed such that two opposite edges of the sheet metal portion are disposed in parallel adjacent relationship to one another so as to provide the sheet metal portion with a tubular configuration. The roll formed sheet metal portion has a plurality of stamped projections formed along a third edge thereof weldedly connected to the metal base member. A bore defined by the tubular configuration of the roll formed sheet metal portion is generally aligned with the opening in the metal base member.

[0008] It is a further object of the Invention to provide a vehicle truck bed that incorporates the spacer discussed above. In accordance with this object, the present invention provides a vehicle truck bed comprising a truck bed panel, a vehicle frame structure, and a frame support disposed between the truck bed and the frame structure for mounting the truck bed panel on the frame structure. A fixing structure fixes the truck bed panel to the vehicle frame structure. The fixing structure includes a metal base member defining an opening and mounted on the cross member, and a sheet metal portion roll formed such that two opposite parallel edges of the sheet metal portion are disposed in parallel adjacent relationship to one another so as to provide the sheet metal portion with a tubular configuration. The roll formed sheet metal portion has a plurality of stamped projections formed along a third edge thereof weldedly connected to the metal base member. A bore defined by the tubular configuration of the roll formed sheet metal portion is generally aligned with the opening in the metal base member. A fastener extends through an opening in the truck bed, an opening in the frame structure, the opening in the metal base member, and the bore so as to secure the truck frame to the truck bed panel.

[0009] These and other objects, features, and advantages of this invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings which illustrate, by way of example, the principles of this invention.

Brief Description of the Drawings

[0010]

Fig. 1 is a cross-sectional view of a projection welded panel spacer in accordance with the present invention shown in operative relation between a truck bed panel and a cross frame support;

Fig. 2 is a schematic view showing the progression of sheet metal through a progressive die structure to form the spacer tube in accordance with the method of the present invention;

Fig. 3 is a sectional view taken through the line 3-3

In Figure 2;
Fig. 4 is a sectional view taken through the line 4-4 in Figure 2;
Fig. 5 is a sectional view taken through the line 5-5 in Figure 2;
Fig. 6 is a sectional view taken through the line 6-6 in Figure 2;
Fig. 7 is a sectional view taken through the line 7-7 in Figure 2;
Figure 8 is a perspective view of the spacer tube in its form immediately after formation in the progressive die and mounted upon a base plate to which the spacer tube is to be projection welded;
Figure 9 is a schematic representation of the projection or resistance welding operation in which the spacer tube is welded to the spacer tube base plate;
Figure 10 is a perspective view of an oval spacer tube in conjunction with a spacer tube base plate to which the spacer tube is to be projection welded to form a panel spacer in accordance with a second embodiment of the present invention; and
Figure 11 is a schematic representation of a projection or resistance welding operation in which the spacer tube is simultaneously welded to the spacer tube base plate and an upper metal plate in accordance with a third embodiment of the present invention;
Fig. 12 is a cross-sectional view of a projection welded panel spacer in accordance the present invention shown in operative relation with a cross frame support and connecting a truck bed panel with a vehicle frame structure;
Fig. 13 is a schematic view showing the progression of sheet metal through a progressive die structure to form the spacer tube in accordance with another embodiment of the method of the present invention;
Fig. 14 is a sectional view taken through the line 14-14 in Figure 13;
Fig. 15 is a sectional view taken through the line 15-15 in Figure 13;
Fig. 16 is a sectional view taken through the line 16-16 in Figure 13;
Fig. 17 is a sectional view taken through the line 17-17 in Figure 13; and
Fig. 18 is a schematic representation of the projection or resistance welding operation similar to that depicted in Fig. 9, but illustrating an upper electrode which need not be particularly adapted to the shape of the roll formed tubular member.

Detailed Description of the Preferred Embodiments

[0011] Referring more particularly now to the drawings, there is shown in Figure 1 a panel spacer, generally indicated at 10, being used in combination with a cross frame support, generally indicated at 11, and a truck bed panel, generally indicated at 14.

[0012] The panel spacer 10 includes a spacer tube 12 welded at its lower end 15 to a metal base plate member 16. The panel spacer 10 further includes a fixing assembly, preferably in the form of a bolt assembly indicated at 18. The bolt assembly 18 preferably includes a carriage bolt 20, a washer 22, and a nut 24 threaded securely to the threaded portion of the carriage bolt 20.

[0013] In the embodiment shown, the panel spacer 10 preferably includes an upper metal member which closes-off or "caps" the cross frame support structure 11. The upper metal member is preferably in the form of a plate 26 and facilitate securement of the truck bed panel 14 to the cross frame support structure 11. The upper metal member or plate 26 need not be fixed to the upper end spacer tube 12, and may simply rest thereupon. It is contemplated, however, that this plate 26 may be fixed by conventional welding.

[0014] Preferably, the spacer tube 12 has a generally cylindrical configuration, although the present invention contemplates tubular arrangement of other configurations, such as one with a squared configuration. The carriage bolt 20 extends through a central bore 28 through the spacer tube 12. In addition, the lower end 15 of the spacer tube 12 which is welded to the metal base plate member 16, as will be described in greater detail later, is disposed in surrounding relation to an opening or hole 30 in the base plate 16, so that a threaded portion of the carriage bolt 20 is disposed beyond the longitudinal extent of the spacer tube 12 to receive the nut 24.

[0015] In the arrangement shown, the spacer tube 12 and the base plate member 16 welded thereto are dropped as a unit into the well or U-shaped cross-sectional configuration of the frame support 11, so that the bottom surface of the base plate member 16 can be spot welded to the bottom wall 34 of the frame support 11. The hole 30 in the base plate member 16 is aligned with a hole 36 in the bottom wall 34 of the frame support 11 before the base plate member 16 is spot welded to the wall 34.

[0016] After this welding operation, the cross frame cap 26 is mounted onto laterally outwardly projecting flanges 38 and 40 of the frame support 11 and spot welded thereto. The cap 26 has an opening 44 which is aligned with the openings or holes 30 and 36 prior to spot welding the cap 26 to the flanges 38 and 40. Next, the truck bed panel 14 is mounted on the cross frame cap 26. The bed panel 14 has an opening 46 which is in alignment with the openings 44, 30 and 36. The cross frame cap 26 provides a support surface for the truck bed panel 14.

[0017] Next, the carriage bolt 20 is passed through the openings 46, 44, 30, and 36 until the head 48 of the carriage bolt 20 engages the upper surface of the truck bed panel 14. At this point, the threaded portion of the bolt 20 has passed through the spacer tube 12, through the base plate member 16, and through the lower wall 34 of the frame support 11. The nut 24 is then secured to the threaded portion of the carriage bolt 20 and tightened in place.

[0018] By providing the panel spacer 10, the tightening of the nut 24 will not crush in or indent the truck bed panel 14 when the nut 24 is tightened to a significant extent.

[0019] Referring now to Figs. 2-9, there is showing a method of manufacturing the panel spacer 10 in accordance with the principles of the present invention.

[0020] Fig. 2 shows the manner in which a strip of sheet metal is manipulated through a progressive die to form the spacer tube 12 with a series of circumferentially spaced projections along its lower edge. In a first die operation, a strip of sheet metal 50 is punched to form a straight forward edge 52 and a rearward edge 54 having a plurality of depending projections 56. This first stamped configuration 58 remains connected with the preceding strip of material 50 by a small interconnecting strip portion 60 at one of the corners of the material.

[0021] Fig. 3 is a cross-sectional view taken through the line 3-3 in Figure 2 in the direction transverse to the direction of sheet metal movement through the progressive die. As shown in Figure 3, the initial stamping 58 has a substantially flat cross-section.

[0022] Referring back to Figure 2, it can be appreciated that in a subsequent configuration 64, achieved by the progressive die, a longitudinal edge 62 which extends in a longitudinal direction perpendicular to edges is slightly curled. This can be appreciated more fully from Figure 4, which is a cross-sectional view taken through the line 4-4 in Figure 2.

[0023] A subsequent configuration 66 of the sheet metal is shown in Figure 2. As can be appreciated from the cross-sectional view of Figure 5, taken through the line 5-5 in Figure 2, the sheet metal is punched into a substantially J-cross-sectional configuration.

[0024] Referring back to Figure 2, the sheet metal is worked into the next configuration as indicated at 68, and is generally cylindrical in form. As can be appreciated from Figure 6, which is a cross-sectional view taken through the line 6-6 in Figure 2, the generally cylindrical configuration 68 has an overlapping or extended portion 70 which extends beyond the edge 62.

[0025] Referring back to Figure 2, a final configuration 72 is provided. The final configuration 72 is substantially cylindrical in form. As can be appreciated from Figure 7, which is a cross-sectional view taken through the line 7-7 in Figure 2, the end portion 70 as shown in Figure 6 is cut off from the final configuration so that an opposite edge 74 of the sheet metal is disposed in adjacent relation to the edge 62. While these edges 62, 74 may subsequently be brought into contact, this is not required, as these edges will not be seam welded to one another.

[0026] As can also be appreciated from Figure 2, the connecting portion 60 which attaches to each portion of sheet metal to the previous portion of sheet metal to be formed into a spacer tube, is dislodged and discarded.

[0027] Referring now to Figure 8, it can be appreciated that the general cylindrical configuration 72, which eventually forms the spacer tube 12, is placed upon the base plate 16 in accordance with the method of the present invention.

[0028] As is illustrated in the cross-sectional view of Figure 9, the tubular cylindrical sheet metal configuration 72 and the base plate 16 are projection welded to one another in a projection welding operation. The projection welding operation is a form of resistance welding in which the tubular cylindrical member 74 and base plate 16 are positioned in a discharge welding apparatus including a vertically movable upper electrode 80, and a stationery lower electrode 82. The tubular component 72 is forced against the base plate 16 under pressure applied by downward movement of the upper movable electrode 80. An electrical current is then passed between the upper movable electrode 80 and the lower stationery electrode 82. This causes the projections 56 to heat rapidly due to their relatively small surface areas in contact with the base plate 16. As the electrical current is passed through the projections 56, they reach the molten metal stage, as does a small portion of the base plate 16 which directly contacts the projections 56. The pressure applied by the upper movable electrode 80 then further forces the two components together and holds them in place until the molten metal fuses and cools forming a single welded component. This single component constitutes the spacer 10 and base plate 16 illustrated in Figure 1.

[0029] Shown in Figure 10 is an alternate configuration for a tubular member, as generally indicated at 90, which is to be welded to the base plate 16. As shown, the tubular member 90 has a generally oval configuration.

[0030] In accordance with the present invention, a projection welded spacer which includes a spacer tube and base plate is formed. Because a resistance weld is used to weld the base plate 16 to the spacer tube 12, less heat is employed, causing little or no warping of the mounting surfaces. In addition, the quality of the resulting part is superior in comparison with the conventional systems in which a spacer tube is mig or arc welded to a base plate 16, as these welding operations are relatively messy and more expensive.

[0031] In addition, because the tubular member 72, including projections 56, is formed in a progressive die in the manner disclosed, the tubular component which is to be welded is significantly less expensive in comparison with arrangements in which tubular stock material would be used. In addition, unlike tubular stock material, the tubular member utilized in accordance with the present invention need not be seam welded to form a complete cylindrical configuration, as can be appreciated from the cross-sectional view of Figure 7.

[0032] Figure 11 illustrates a further embodiment for manufacturing the panel spacer 10 illustrated in Figure 1. In the embodiment of Figure 11, the upper plate 26 is fixed to the upper end of spacer tube 12 by a projection or resistance weld at the same time that the lower base plate is projection or resistance welded to the lower end

of the spacer tube 12. In this embodiment, the sheet metal is formed substantially as described above, with the exception that a plurality of upper projections 86 are formed (stamped) on an edge opposite the lower projections 56. Preferably, the stamping of the upper projections 86 are formed concurrently with the stamping of the lower projections 56. The projections 56 and 86 enable the spacer tube 12 to be simultaneously projection welded to the base plate 16 and the upper plate 26 for added efficiency in manufacturing a panel spacer in which the upper plate 26 is to be fixed to the spacer tube 12.

[0033] As can be appreciated from FIGS. 9 and 11, for ease of manufacture, it is preferred for the openings 30 and 44 to be formed in the respective plate members 16 and 26 prior to the projection welding operation. It should also be noted that in FIGS. 9 and 11, two of the three projections 56 are illustrated in phantom for the purpose of facilitating an understanding of this invention, although only one of these three projections (the centered one) would ordinarily be visible in the cross sections taken. The same is true with respect to projections 86 in FIG. 11 and the projections illustrated in FIG. 18, discussed below. It should be understood that the three projections are merely a preferred example, and that more or less projections may be provided. Most preferably, at least three projections are provide to enable the roll formed tubular member to be balanced on the metal base member 16.

[0034] FIG. 12 is similar to FIG. 1, but illustrates the panel spacer 10 connecting the vehicle frame 102 to the panel 104 of a truck bed.

[0035] FIGS. 13-17 illustrate another embodiment of the method in accordance with the present invention.

[0036] FIGS. 13-17 are similar to FIGS. 2-7 but, as can be appreciated from FIG. 13, illustrates a method in which the interconnecting strip portions 160 connect adjacent portions of sheet metal towards the centers of the adjacent edges of the respective portions of sheet metal. This is opposed to the strip portions 60 connecting the corners of the material as disclosed in FIGS. 2-7.

[0037] In addition, as can be best appreciated from FIGs. 15 and 16, in this embodiment, both opposite edges the sheet metal are rolled towards one another to provide the tubular configuration of the spacer tube. This is in contrast to the prior embodiment, wherein it can be appreciated from FIGS. 4 and 5 that only one edge is rolled towards the opposite edge.

[0038] As with the prior embodiment, the embodiment of FIG. 13 also contemplates that projections may be stamped on both the leading and trailing edges of the sheet metal portion to enable both ends of the roll formed tubular structure to be projection or spot welded to respective metal members (e.g, as in FIG. 11). In addition, as with the prior embodiment, it is preferred for the adjacent edges forming seam 170 in the roll formed tubular member (see FIG. 17) to be in adjacent or abutting relation with one another (the edges do not need to contact one another, although they may), and do not need to be welded. Welding would require an additional step and an additional expense that is preferably not incurred in the method of the present invention.

[0039] Fig. 18 is a schematic representation of the projection or resistance welding operation similar to that depicted in Fig. 9, but illustrating that the upper electrode need not be particularly adapted to the shape of the roll formed tubular member. Thus, the method is flexible as the same welding apparatus can be used weld many different shapes of tubular members and base plate members.

[0040] The foregoing detailed description of the preferred embodiments of this invention has been provided for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise embodiments disclosed. Other modifications and variations may be evident to practitioners in the art when considered in reference to this disclosure.

Claims

1. A method for making a spacer assembly, comprising:

   roll forming a portion of sheet metal (50) into a tubular configuration such that two opposite edges (62, 74) of said sheet metal portion are disposed in parallel adjacent relationship, said tubular configuration being provided with a plurality of projections (56) formed on a third edge (54) portion of said sheet metal;

   positioning said roll formed portion of sheet metal and a metal base member (16) to which said roll formed portion of sheet metal is to be welded in a discharge welding apparatus having a pair of electrodes (80, 82) so that the projections of said roll formed portion of sheet metal contact a surface of said metal base member;

   providing a force so that the projections are disposed in forcible engagement with the surface of said metal base member; and

   supplying an electrical current between the pair of electrodes (80, 82) and through said roll formed portion of sheet metal and said metal base member to enable the projections to reach a molten metal stage and be subsequently solidified so that the roll formed portion of sheet metal is welded to said metal base member (16),

   the method being **characterized by** forming the plurality of projections (56) along said edge portion of sheet metal (50) before roll forming into said tubular configuration and wherein said opposite parallel adjacent edges (62,74) are not welded to one another.

2. A method as in claim 1, wherein said two opposite edges (62, 74) remaining unwelded to each other when said roll formed portion of sheet metal is welded to said metal base member (16).

3. A method according to claim 1, wherein said forming results in an interconnecting portion (60) being formed between said portion of sheet metal and a preceding portion of sheet metal, further comprising the step of:

removing the interconnecting portion (60) between said portion of sheet metal and the preceding portion of sheet metal after said portion of sheet metal is roll formed into said tubular configuration.

4. A method according to claim 1, further comprising the steps of:

positioning a metal member (26) on a fourth edge (52) of said roll formed portion of sheet metal opposite said third edge (54) on which said projections are formed;
fixing said metal member to said fourth edge of said roll formed portion of sheet metal;

wherein said metal member defines an opening, said opening being generally aligned with a bore (28) defined by said tubular configuration of said roll formed portion of sheet metal and an opening (36) defined in the metal base member.

5. A method according to claim 1, wherein said forming comprises a stamping operation.

6. A method according to claim 1, further comprising

forming a plurality of projections (86) along a fourth edge (52) opposite said third edge (54) of said portion of sheet metal;
engaging said projections (86) along said fourth edge with a metal member (26);
wherein said force causes said projections along said fourth edge to be disposed in forcible engagement with said metal member (26); and
wherein said supplying of electric current causes said projections along said fourth edge to reach a molten stage, to be subsequently solidified to weld said roll formed portion of sheet metal to said metal member (26) at said fourth edge, so that said metal member and said metal base member (16) are substantially simultaneously welded to said roll formed portion of sheet metal.

7. A method according to claim 1, wherein said metal base member (16) is formed in a stamping operation, including stamping of a hole therethrough, said hole being generally aligned with a bore (28) defined by said tubular configuration of said roll formed portion of sheet metal (50) when said projections (56) are disposed in forcible engagement with the surface of said sheet metal.

8. A method according to claim 6, wherein said metal base member (16) and said metal member (26) are both formed in a stamping operation, including stamping of respective holes therethrough, said holes being generally aligned with a bore (28) defined by said tubular configuration of said roll formed portion of sheet metal (50) when said metal member (16) and said metal base member (26) are welded to said roll formed portion of sheet metal.

9. A spacer, comprising:

a metal base member (16) defining an opening; and
a sheet metal portion (50) roll formed such that two opposite edges (62,74) of said sheet metal portion are disposed in parallel adjacent relationship to one another so as to provide said sheet metal portion with a tubular configuration, said roll formed sheet metal portion having a plurality of stamped projections (56) formed along a third edge (54) thereof weldedly connected to said metal base member, and wherein a bore (28) defined by said tubular configuration of said roll formed sheet metal portion is generally aligned with said opening in said metal base member,
the sheet metal portion **characterized in that** the projections are stamped prior to roll forming the sheet metal and wherein said parallel adjacent edges (62,74) are not welded to one another.

10. A spacer according to claim 9, further comprising:

an opposite metal member (26) welded to a fourth edge (52) of said roll formed sheet metal portion opposite said third edge (54) having said projections, said opposite metal member having an opening which is aligned with the bore (28) of said roll formed sheet metal portion and the opening of said metal base member.

11. A vehicle truck bed comprising:

a truck bed panel (104);
a vehicle frame structure (102);
a frame support (11) disposed between said truck bed panel (104) and said frame structure (102) for mounting said truck bed panel on said frame structure; and

a fixing structure which fixes the truck bed panel to the vehicle frame structure, said fixing structure including
a metal base member (16) defining an opening and mounted on said frame support;
a sheet metal portion (50) roll formed such that two opposite parallel edges of said sheet metal portion are disposed in parallel adjacent relationship to one another so as to provide said sheet metal portion with a tubular configuration, said roll formed sheet metal portion having a plurality of stamped projections (56) formed along a third edge thereof weldedly connected to said metal base member, and wherein a bore (28) defined by said tubular configuration of said roll formed sheet metal portion is generally aligned with said opening in said metal base member; and
a fastener (20) extending through an opening in said truck bed panel, an opening in said frame structure, said opening in said metal base member, and said bore so as to secure said truck frame to said truck bed panel, .
the fixing structure **characterized in that** the projections on the sheet metal portion are stamped prior to roll forming the sheet metal and wherein said parallel adjacent edges (62,74) are not welded to one another.

Patentansprüche

1. Verfahren zur Herstellung einer Abstandshalteranordnung, bei dem

   ein Abschnitt eines Bleches (50) in eine rohrförmige Konfiguration so profilgewalzt wird, dass zwei entgegengesetzten Ränder (62, 74) des Blechabschnitts in paralleler angrenzender Beziehung angeordnet sind, wobei die rohrförmige Konfiguration mit einer Vielzahl von Vorsprüngen (56) versehen wird, die an einem Abschnitt mit einem dritten Rand (54) des Bleches ausgebildet sind;
   der profilgewalzte Abschnitt des Bleches und ein Basiselement (16) aus Metall, an das der profilgewalzte Abschnitt des Bleches zu schweißen ist, so in einer Entladungsschweißvorrichtung mit zwei Elektroden (80, 82) angeordnet werden kann, dass die Vorsprünge des profilgewalzten Abschnitts des Blechs eine Fläche des Basiselementes aus Metall berühren;
   eine Kraft so vorgesehen wird, dass die Vorsprünge in Zwangseingriff mit der Oberfläche des Basiselements aus Metall angeordnet werden, und
   ein elektrischer Strom zwischen die zwei Elektroden (80, 82) und durch den profilgewalzten Abschnitt des Bleches und das Basiselement aus Metall zugeführt wird, damit die Vorsprünge einen Schmelzmetallzustand erreichen und daraufhin erstarren können, so dass der profilgewalzte Abschnitt des Bleches an das Basiselement (16) aus Metall geschweißt wird,

   wobei das Verfahren **dadurch gekennzeichnet ist, dass** die Vielzahl von Vorsprüngen (56) entlang des Randabschnitts des Bleches (50) vor dem Profilwalzen in die rohrförmige Konfiguration ausgebildet werden und die entgegengesetzten parallel angrenzenden Ränder (62, 74) nicht miteinander verschweißt werden.

2. Verfahren nach Anspruch 1, bei dem die zwei entgegengesetzten Ränder (62, 74) miteinander unverschweißt bleiben, wenn der profilgewalzte Abschnitt des Bleches mit dem Basiselement (16) aus Metall verschweißt ist.

3. Verfahren nach Anspruch 1, bei dem die Ausbildung in einem Zwischenverbindungsabschnitt (60) resultiert, der zwischen dem Abschnitt des Bleches und einem vorhergehenden Abschnitt des Bleches ausgebildet ist, außerdem den Schritt umfassend, dass

   der Zwischenverbindungsabschnitt (60) zwischen dem Abschnitt des Bleches und dem vorhergehenden Abschnitt des Bleches entfernt wird, nachdem das Blech in die rohrförmige Konfiguration profilgewalzt wurde.

4. Verfahren nach Anspruch 1, außerdem die Schritte umfassend, dass

   ein Metallelement (26) an einem vierten Rand (52) des profilgewalzten Abschnitt des Bleches dem dritten Rand (54) entgegengesetzt angeordnet wird, an dem die Vorsprünge ausgebildet werden;
   das Metallelement an dem vierten Rand des profilgewalzten Abschnitts des Bleches befestigt wird,

   wobei das Metallelement eine Öffnung bildet, wobei die Öffnung insgesamt mit einer Bohrung (28), die durch die rohrförmige Konfiguration des profilgewalzten Abschnitts des Bleches gebildet wird, und einer Öffnung (36) fluchtet, die in dem Basiselement aus Metall ausgebildet ist.

5. Verfahren nach Anspruch 1, bei dem die Ausbildung einen Stanzvorgang umfasst.

6. Verfahren nach Anspruch 1, bei dem außerdem

eine Vielzahl von Vorsprüngen (86) entlang eines vierten Randes (52) ausgebildet wird, der dem dritten Rand (54) des Abschnitts des Bleches entgegengesetzt ist;
die Vorsprünge (86) entlang des vierten Randes mit einem Metallelement (26) in Eingriff gebracht werden;
wobei die Vorsprünge entlang des vierten Randes durch die Kraft in Zwangseingriff mit dem Metallelement (26) gebracht werden, und
wobei durch die Zuführung des elektrischen Stroms die Vorsprünge entlang des vierten Randes einen Schmelzzustand erreichen und anschließend erstarren, um den profilgewalzten Abschnitt des Bleches an das Metallelement (26) an dem vierten Rand zu verschweißen, so dass das Metallelement und das Basiselement (16) aus Metall im Wesentlichen gleichzeitig an den profilgewalzten Abschnitt des Bleches geschweißt werden.

7. Verfahren nach Anspruch 1, bei dem das Basiselement (16) aus Metall in einem Stanzvorgang geformt wird, der auch das Durchstanzen eines Loches umfasst, wobei das Loch insgesamt mit einer Bohrung (28) fluchtet, die durch die rohrförmige Konfiguration des profilgewalzten Abschnitt des Bleches (50) gebildet wird, wenn die Vorsprünge (56) in Zwangseingriff mit der Oberfläche des Bleches angeordnet sind.

8. Verfahren nach Anspruch 6, bei dem sowohl das Basiselement (16) aus Metall als auch das Metallelement (26) in einem Stanzvorgang geformt werden, der das Durchstanzen jeweiliger Löcher umfasst, wobei die Löcher insgesamt mit einer Bohrung (28) fluchten, die durch die rohrförmige Konfiguration des profilgewalzten Abschnittes des Bleches (50) gebildet wird, wenn das Metallelement (16) und das Basiselement (26) aus Metall an den profilgewalzten Abschnitt des Bleches geschweißt werden.

9. Abstandshalter mit

einem Basiselement (16) aus Metall, das eine Öffnung bildet, und
einem Blechmetallabschnitt (50), der so profilgewalzt ist, dass zwei entgegengesetzte Ränder (62, 74) des Blechabschnitts in paralleler angrenzender Beziehung zueinander angeordnet werden, um den Blechabschnitt mit einer rohrförmigen Konfiguration zu versehen, wobei der profilgewalzte Blechabschnitt mehrere gestanzte Vorsprünge (56) aufweist, die entlang eines dritten Randes (54) angeordnet sind, der mit dem Basiselement aus Metall durch Schweißen verbunden ist, wobei eine Bohrung (28), die durch die rohrförmige Konfiguration des profilgewalzten Blechabschnitts gebildet wird, insgesamt mit einer Öffnung in dem Basiselement aus Metall fluchtet, wobei der Blechabschnitt **dadurch gekennzeichnet ist, dass** die Vorsprünge gestanzt werden, bevor das Blech profilgewalzt wird, wobei die parallel angrenzenden Ränder (62, 74) nicht miteinander verschweißt werden.

10. Abstandshalter nach Anspruch 9, außerdem umfassend

ein entgegengesetztes Metallelement (16), das an einen vierten Rand (52) des profilgewalzten Blechabschnitts dem dritten Rand (54) mit den Vorsprüngen entgegengesetzt geschweißt ist, wobei das entgegengesetzte Metallelement eine Öffnung aufweist, die mit einer Bohrung (28) in dem profilgewalzten Blechabschnitt und der Öffnung in dem Basiselement aus Metall fluchtet.

11. Fahrzeuguntergestell mit

einem Untergestellblech (104),
einem Kraftfahrzeug-Rahmenaufbau (102),
einem Rahmenträger (11) der zwischen dem Untergestellblech (104) und dem Rahmenaufbau (102) zur Befestigung des Untergestellblechs an dem Rahmenaufbau angeordnet ist, und
einem Befestigungsaufbau, der das Untergestellblech an dem Fahrzeugrahmenaufbau befestigt, wobei der Befestigungsaufbau umfasst:

ein Basiselement (16) aus Metall, das eine Öffnung bildet und an dem Rahmenträger befestigt ist,
einen Blechabschnitt (50), der so profilgewalzt ist, dass zwei parallele Ränder des Blechabschnitts in paralleler angrenzender Beziehung zueinander angeordnet sind, um den Blechabschnitt mit einer rohrförmigen Konfiguration zu versehen, wobei der profilgewalzte Blechabschnitt mehrere gestanzte Vorsprünge (56) aufweist, die entlang eines dritten Randes ausgebildet sind,
der mit dem Basiselement aus Metall verschweißt ist, und wobei eine Bohrung (28), die durch die rohrförmige Konfiguration des profilgewalzten Blechabschnitts gebildet wird, insgesamt mit einer Öffnung in dem Basiselement aus Metall fluchtet, und
ein Befestigungselement (20), das sich durch eine Öffnung in dem Untergestellblech, eine Öffnung in dem Rahmenauf-

bau, die Öffnung in dem Basiselement aus Metall und die Bohrung erstreckt, um den Untergestellrahmen an den Untergestellblech zu befestigen,

wobei der Befestigungsaufbau **dadurch gekennzeichnet ist, dass** die Vorsprünge an dem Blechabschnitt gestanzt worden sind, bevor das Blech profilgewalzt wurde, wobei die parallel angrenzenden Ränder (62, 74) nicht miteinander verschweißt sind.

Revendications

1. Procédé de fabrication d'un ensemble d'entretoise de maintien comprenant :

   le profilage d'une portion de tôle métallique (50) en une configuration tubulaire, de sorte que deux bords opposés (62, 74) de ladite portion de tôle métallique soient disposés dans une relation adjacente et parallèle, ladite configuration tubulaire étant pourvue d'une pluralité de saillies (56) formées sur un troisième bord (54) de ladite portion de tôle métallique;
   le positionnement de ladite portion de tôle métallique profilée et d'un élément de base en métal (16) auquel ladite portion de tôle métallique profilée doit être soudée dans un appareil de soudage à décharge possédant une paire d'électrodes (80, 82) de façon que les saillies de ladite portion de tôle métallique profilée touchent une surface dudit élément de base en métal ;
   l'application d'une force afin que les saillies soient engagées de force avec la surface dudit élément de base en métal ; et
   l'application d'un courant électrique entre la paire d'électrodes (80, 82) et à travers ladite portion de tôle métallique profilée et ledit élément de base en métal, pour que les saillies puissent atteindre un état de métal fondu et être ensuite solidifiées afin que la portion de tôle métallique profilée soit soudée audit élément de base en métal (16),
   ledit procédé étant **caractérisé par** la formation d'une pluralité de saillies (56) le long de ladite portion de bord de la tôle métallique (50) avant le profilage de celle-ci dans ladite configuration tubulaire, et dans lequel lesdits bords opposés parallèles et adjacents (62, 74) ne sont pas soudés l'un à l'autre.

2. Procédé selon la revendication 1, dans lequel lesdits deux bords opposés (62, 74) demeurent non soudés l'un-à l'autre lorsque ladite portion de tôle métallique profilée est soudée audit élément de base.en métal (16).

3. Procédé selon la revendication 1, dans lequel ledit profilage résulte en une portion de raccordement (60) formée entre ladite portion de tôle métallique et une portion précédente de tôle métallique, comprenant en outre l'étape suivante :

   enlèvement de la portion de raccordement (60) entre ladite portion de tôle métallique et une portion précédente de tôle métallique après que ladite portion de tôle métallique a été profilée en ladite configuration tubulaire.

4. Procédé selon la revendication 1, comprenant en outre les étapes suivantes :

   le positionnement d'un élément en métal (26) sur un quatrième bord (52) de ladite portion de tôle métallique profilée opposé audit troisième bord (54) sur lequel lesdites saillies sont formées ;
   la fixation dudit élément en métal audit quatrième bord de ladite portion de tôle métallique profilée ;

   dans lequel ledit élément en métal définit une ouverture, ladite ouverture étant généralement alignée avec un alésage (28) défini par ladite configuration tubulaire de ladite portion de tôle métallique profilée et une ouverture (36) définie dans l'élément de base en métal.

5. Procédé selon la revendication 1, dans lequel ledit profilage comprend une opération d'estampage.

6. Procédé selon la revendication 1, comprenant en outre :

   la formation d'une pluralité de saillies (86) le long d'un quatrième bord (52) opposé audit troisième bord (54) de ladite portion de tôle métallique ;
   l'engagement desdites saillies (86) situées le long du quatrième bord avec un élément en métal (26) ;
   dans lequel ladite force fait que lesdites saillies situées le long du quatrième bord s'engagent de force avec ledit élément en métal (26) ; et
   dans lequel ladite application d'un courant électrique fait que lesdites saillies situées le long du quatrième bord atteignent un état fondu, pour être ensuite solidifiées pour souder ladite portion de tôle métallique profilée audit élément en métal (26) sur ledit quatrième bord, de façon que ledit élément en métal et ledit élément de base en métal (16) soient soudés essentiellement simultanément à ladite portion de tôle mé-

tallique profilée.

7. Procédé selon la revendication 1, dans lequel ledit élément de base en métal (16) est formé lors d'une opération d'estampage, incluant l'estampage d'un trou dans l'élément, ledit trou étant généralement aligné avec un alésage (28) défini par ladite configuration tubulaire de ladite portion de tôle métallique profilée (50) lorsque lesdites saillies (56) sont engagées de force avec la surface de ladite tôle métallique.

8. Procédé selon la revendication 6, dans lequel ledit élément de base en métal (16) et ledit élément en métal (26) sont formés lors d'une opération d'estampage, incluant l'estampage de trous respectifs dans lesdits éléments, lesdits trous étant généralement alignés avec un alésage (28) défini par ladite configuration tubulaire de ladite portion de tôle métallique profilée (50) lorsque ledit élément de base en métal (16) et ledit élément en métal (26) sont soudés à ladite portion de tôle métallique profilée.

9. Entretoise de maintien comprenant :

un élément de base en métal (16) définissant une ouverture, et
une portion de tôle métallique (50) profilée de façon que deux bords opposés (62, 74) de la portion de tôle métallique soient disposés dans une relation adjacente et parallèle pour donner à ladite portion de tôle métallique une configuration tubulaire, ladite portion de tôle métallique profilée étant pourvue d'une pluralité de saillies estampées (56) formées le long de son troisième bord (54), connecté par soudage audit élément de base en métal, et dans laquelle un alésage (28) défini par ladite configuration tubulaire de ladite portion de tôle métallique profilée est généralement aligné avec une ouverture ménagée dans ledit élément de base en métal, ladite portion de tôle métallique étant

caractérisée en ce que les saillies sont estampées avant le profilage de la tôle métallique, et dans lequel lesdits bords parallèles et adjacents (62, 74) ne sont pas soudés l'un à l'autre.

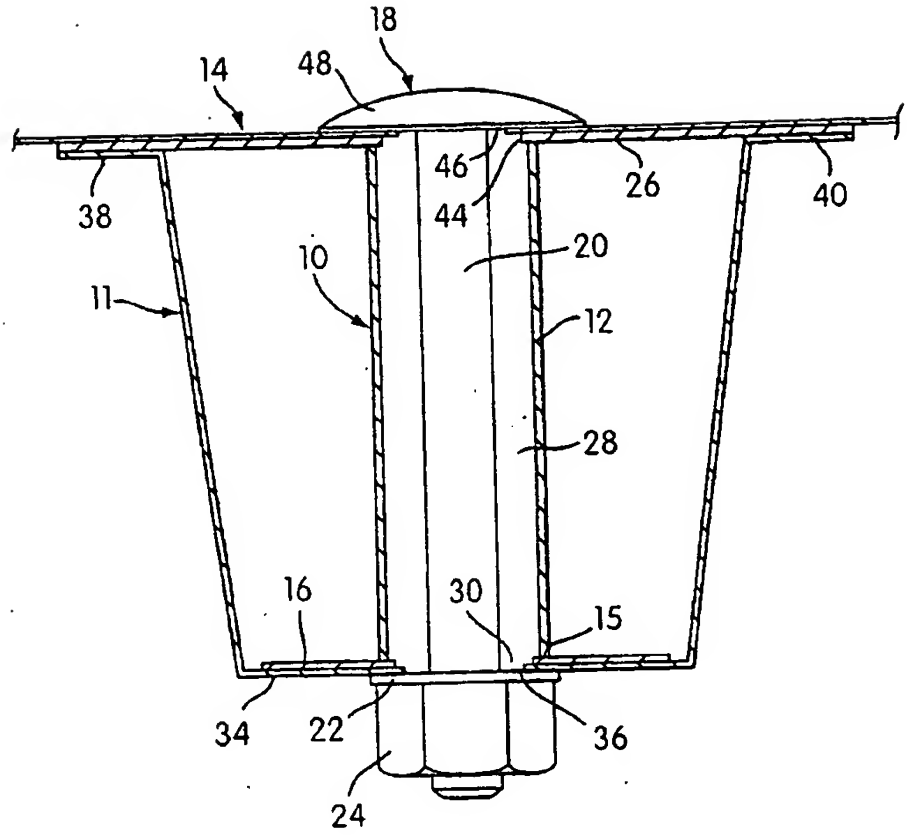
10. Entretoise de maintien selon la revendication 9, comprenant en outre :

un élément en métal opposé (26) soudé à un quatrième bord (52) de ladite portion de tôle métallique profilée opposé audit troisième bord (54) comportant lesdites saillies, ledit élément en métal opposé ayant une ouverture qui est alignée avec l'alésage (28) de ladite portion de tôle métallique profilée et avec l'ouverture dudit élément de base en métal.

11. Plate-forme de véhicule comprenant :

un panneau de plate-forme (104) ;
un châssis de véhicule (102) ;
un support de châssis (11) placé entre ledit panneau de plate-forme (104) et ledit châssis (102) pour monter ledit panneau de plate-forme sur ledit châssis ; et
une structure de fixation qui fixe le panneau de plate-forme au châssis, ladite structure de fixation incluant :

un élément de base en métal (16) définissant une ouverture et monté sur ledit support de châssis ;
une portion de tôle métallique (50) profilée de façon que deux bords opposés parallèles de ladite portion de tôle métallique soient disposés dans une relation adjacente et parallèle pour donner à ladite portion de tôle métallique une configuration tubulaire, ladite portion de tôle métallique profilée étant pourvue d'une pluralité de saillies estampées (5,6) formées le long de son troisième bord connecté par soudage audit élément de base en métal, et dans laquelle un alésage (28) défini par ladite configuration tubulaire de ladite portion de tôle métallique profilée est généralement aligné avec ladite ouverture dans ledit élément de base en métal,
une fixation (20) s'étendant par une ouverture ménagée dans ledit panneau de plate-forme, et par une ouverture ménagée dans ledit châssis, ladite ouverture étant ménagée dans ledit élément de base en métal et ledit alésage afin que le châssis soit fixé audit panneau de plate-forme,
ladite structure de fixation étant **caractérisée en ce que** les saillies sur la portion de tôle métallique sont estampées avant le profilage de ladite tôle métallique, et dans laquelle lesdits bords parallèles et adjacents (62, 74) ne sont pas soudés l'un à l'autre.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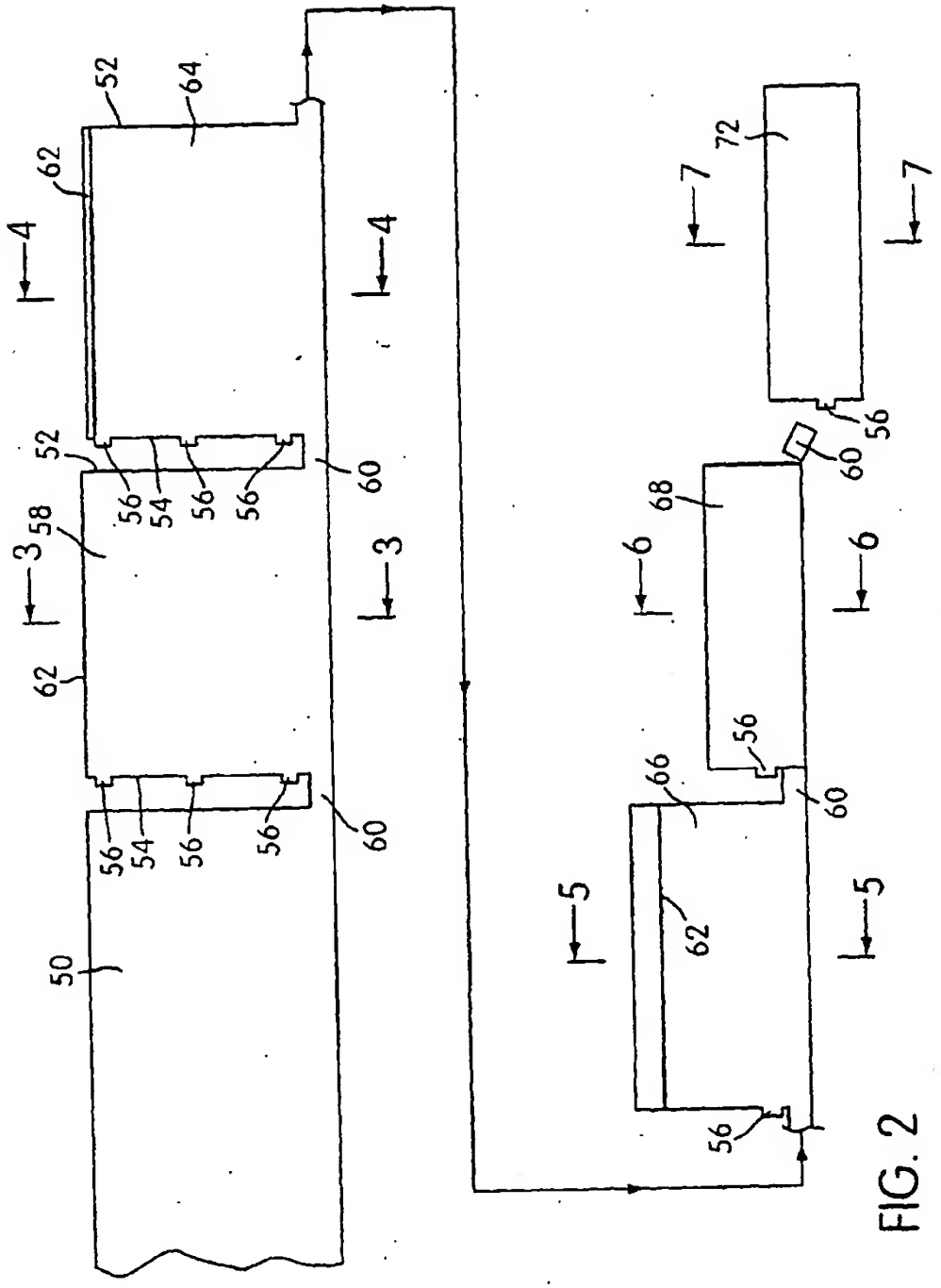
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FIG. 2

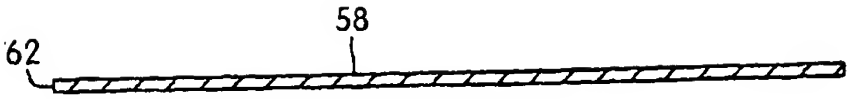

FIG. 3

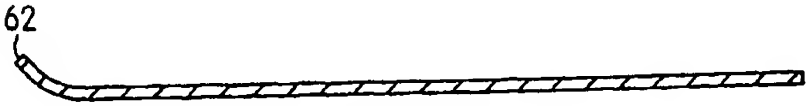

FIG. 4

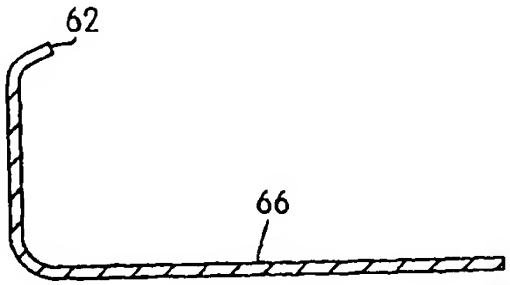

FIG. 5

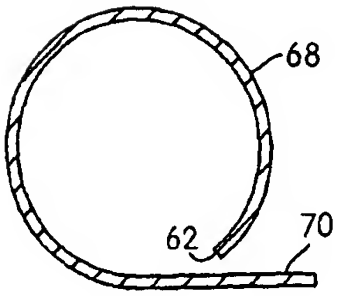

FIG. 6

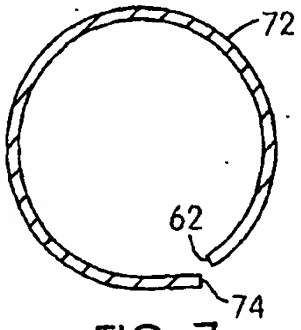

FIG. 7

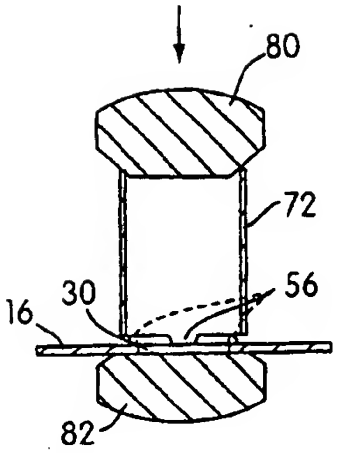

FIG. 9

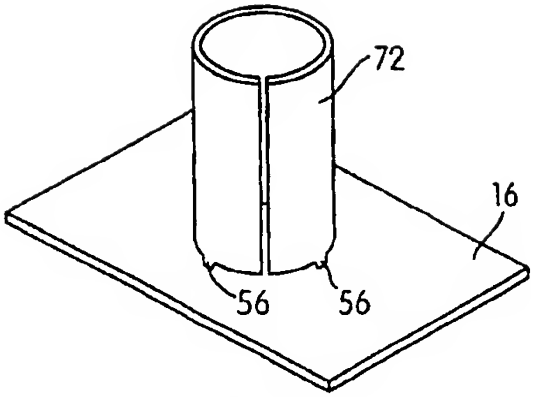

FIG. 8

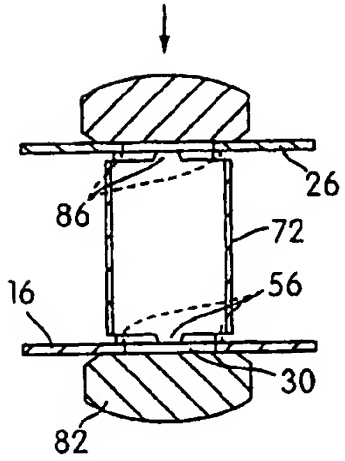

FIG. 11

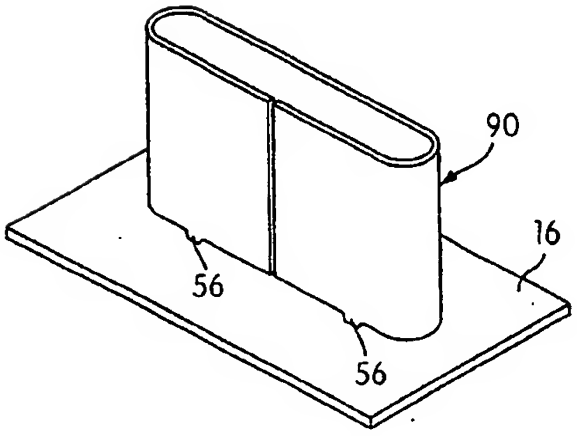

FIG. 10

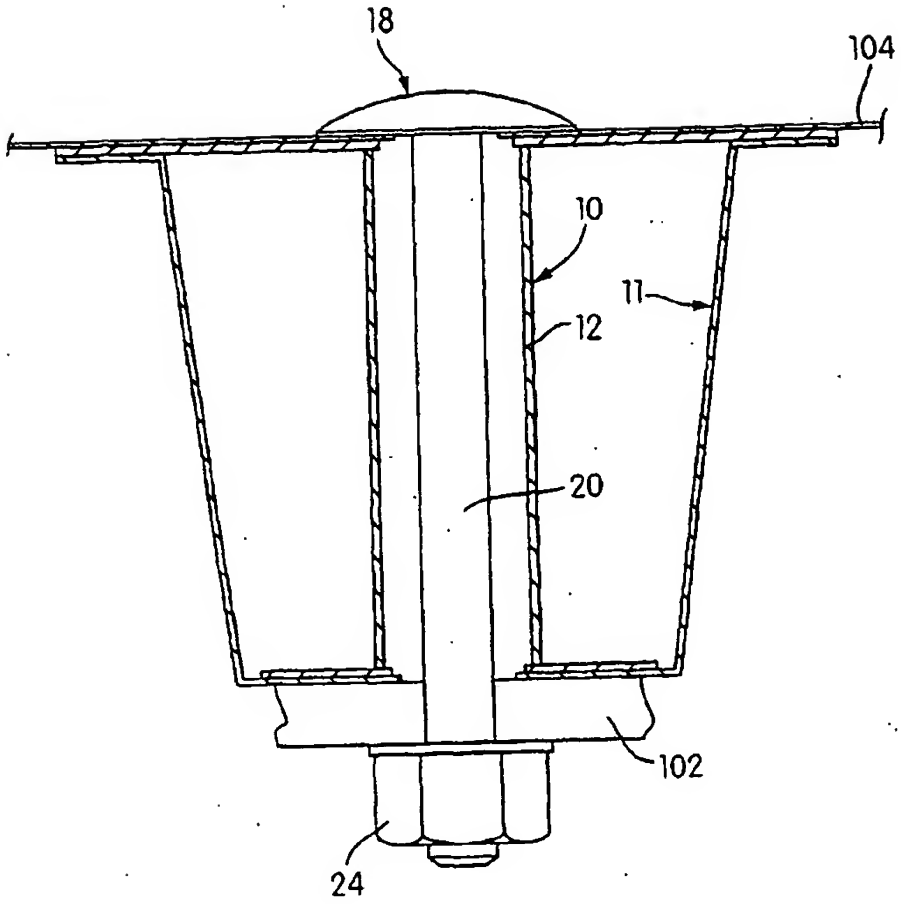

FIG. 12

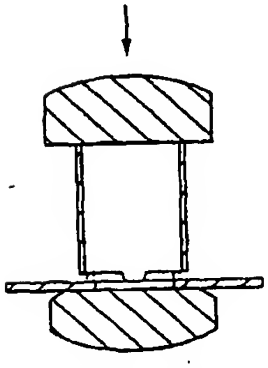

FIG. 18

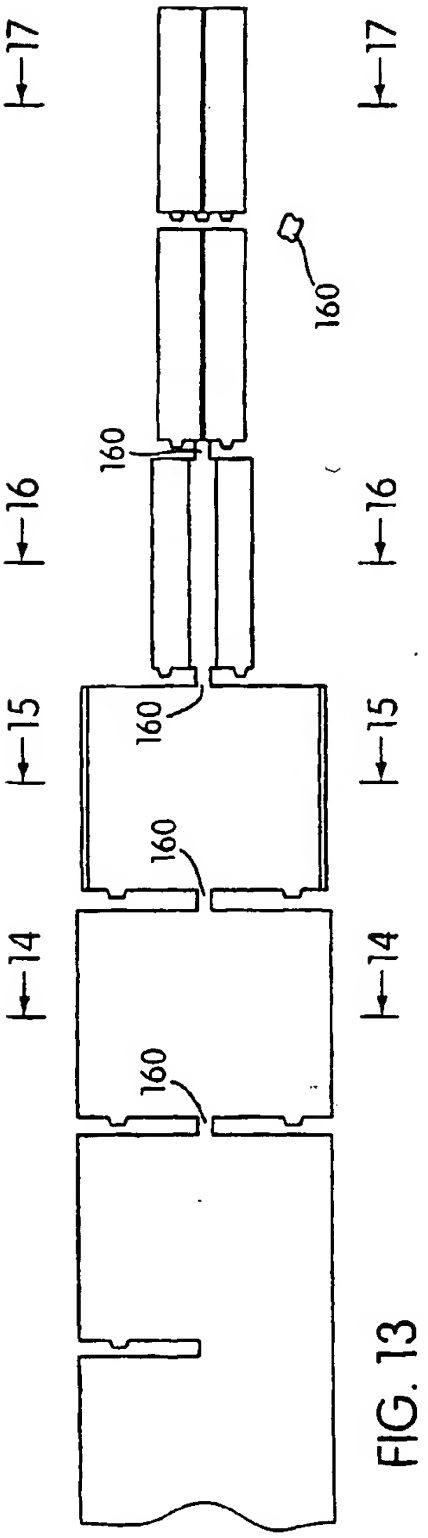

FIG. 13

FIG. 17

FIG. 16

FIG. 15

FIG. 14